12. On the Feet and Glands and other External Characters of the Viverrinæ, with the description of a New Genus.

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(Text-figures 1–7.)

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Apart from *Genetta*, which occurs in South Europe, the Viverrine Carnivores, in the restricted sense in which that term is here employed *, are limited to the Ethiopian and Oriental Regions, and *Viverra* is the only genus hitherto considered to be both Ethiopian and Oriental †. The following species are included in it:—*V. civetta* of tropical Africa, and *V. zibetha*, *civettina*, *megaspila*, and *tangalunga*, which collectively range from western India as far eastward as southern China, Borneo, and the Philippines.

It is the main purpose of the present paper to show that the wide discontinuity in distribution between the African and Asiatic forms is paralleled by structural differences in the glands and feet, necessitating generic recognition (see p. 134) ‡.

Descriptions of the feet of *Viverra* may be found in various memoirs, text-books, and natural histories. These need not be enumerated since the descriptions appear either to be mere copies of previous records dating back at least to 1842, when Hodgson described and figured the hind feet of *V. zibetha*, or to have been derived, like Blanford's account, from Indian species only. It is quite true that statements regarding the feet of *V. civetta* have

* I use the term Viverrinæ for the little group popularly called Civets and Genets, and commonly referred to the three genera, *Viverra*, *Viverricula*, and *Genetta*. *Fossa*, *Linsang*, and *Poiana* are here eliminated from this subfamily.

† The occurrence of *Viverricula* in Sokotra, the Comoro Islands, and Madagascar must surely be assigned to human agency.

‡ Mr. Oldfield Thomas (P. Z. S. 1911, p. 137) has shown that the type of *Viverra* is *zibetha*; and since he agreed with Schreber and other early post-Linnæan authors, who have been followed in this particular by subsequent writers, in restricting the term *zibetha* to the so-called large Indian Civet, it follows that the African species, no other name being apparently available, must receive the new generic title.

been printed, but, instead of being taken from actual specimens, these have been published apparently on the assumption that the African species resembles its Asiatic congeners. At all events, I cannot find any evidence from the works I have consulted that the feet of *V. civetta* have ever been carefully examined with a view to comparison with those of *V. zibetha* or of any other Oriental species*.

The facts substantiated in this paper are the result of the examination of specimens belonging to the two species just mentioned, which died in the Zoological Gardens and came into my hands in a perfectly fresh state. Of *V. zibetha* I have only seen one example, a male, from the Malay Peninsula; but in the case of *V. civetta* my observations have been checked by an inspection of individuals of both sexes of what I take to be the typical race of this species, namely, the form that occurs in Sierra Leone, Liberia, Ashanti, etc.

The Feet of Viverra zibetha *Lnin.*

In his work upon Indian Mammals, Blanford described the feet of *Viverra* as follows:—"Feet truly digitigrade, the metatarsus, metacarpus, and feet being hairy throughout, with the exception of a central and five toe-pads on all feet and a metacarpal pad on each fore limb. Claws small, partially retractile and blunt." This description applies to the feet of *V. zibetha* so far as it goes; but it requires amplification.

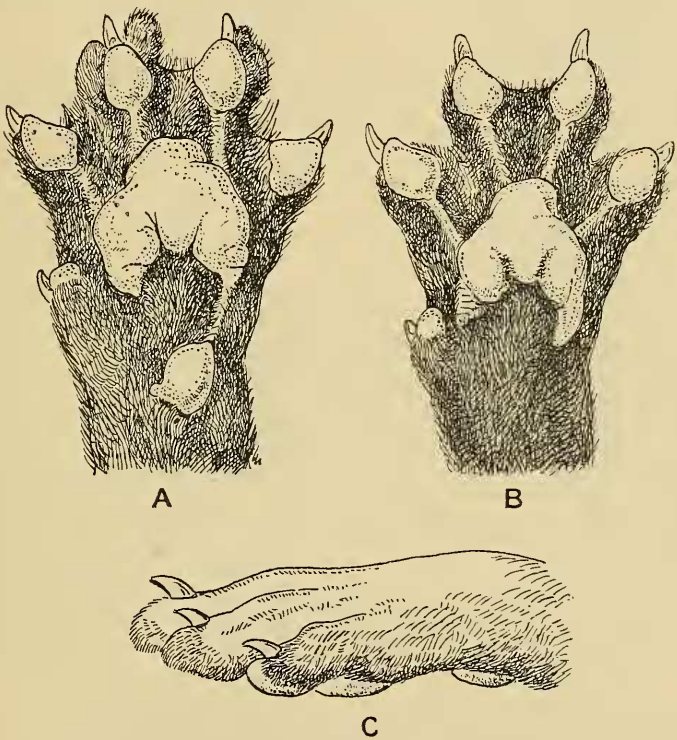
The *fore foot* (text-fig. 1, A, C) is broader and more massive than the hind foot, as in most Carnivores, and carries a larger plantar pad. This pad is smooth and of the usual trilobate form, but with its posterior angles more produced than in the Canidæ and Felidæ. The pollical lobe, however, of the pad is either suppressed or indistinguishably fused with the posterior end of the internal lateral lobe corresponding to the second digit †. The digits are moderately long and fully webbed, the web extending along the inner (admedian) part of the large smooth digital pads well beyond their proximal ends. The lateral webs are more

* Miss Carlsson, however (Zool. Jahrb. Syst. xxviii. p. 559, 1910), gave a brief description of the feet of *V. civetta*, illustrated by two text-figures, to show the differences between them and the feet of *Galidia*, with which the feet of *Mungos* were also compared. So far as it is possible to judge from the somewhat indifferent prints, the paws of the specimen of *V. civetta* she examined agree with those that have come into my hands.

† As in previous papers upon the feet of Carnivora, I use the term "plantar" indifferently for the large main pad of both fore and hind limbs. The trilobed condition of this pad results from the fusion of three originally quite distinct pads set opposite the intervals between the four principal digits, and hence called "interdigital" pads. (See Whipple, Zeitschr. morph. Anthropol. vii. 1904; Kidd, 'The Sense of Touch in Mammals, etc.,' A. & C. Black, 1907; Boas, Zool. Anz. 1909, p. 524.) Sometimes the pad lying primarily opposite the interval between the first and second digits forms part of it; but in the case of the Carnivora, at all events, when this element is indistinguishable, its absence appears to be due to suppression. However that may be, I call this element, when present, the "pollical or hallucal lobe," because of its relations to the 1st digit. The three main lobes of the pad are called the "median," the "internal lateral," and the "external lateral" lobes.

emarginate than the median; and the width of the web joining the 3rd and 4th digits is about equal to the transverse diameter of either pad. Except for a narrow streak of naked or nearly naked skin passing from the digital to the plantar pad, the web is everywhere covered with hair. The pollex or 1st digit has a small but distinct pad situated about on a level with the posterior end of the internal lateral lobe of the plantar pad but separated

Text-figure 1.



A. Inferior view of left fore foot of *Viverra zibetha*.
B. Inferior view of left hind foot of the same.
C. External view of left fore foot of the same.

therefrom by a bridge of hair. The claws are short and retractile. Those of the 1st, 2nd, and 5th digits are unguarded by lobes of skin; but those of the 3rd and 4th digits are protected externally by a lobe of hairy skin, while there is, in addition, on the inner (admedian) side of the 3rd digit a very large flap-like lobe guarding the adjoining claw and the claw of the 4th digit, when the two digits in question are in contact. These claws, in

short, are retractile and as well protected by skin-lobes as in many species of *Felis**.

The *carpal pad* is moderately large but low. It is cordate in outline with the point projecting outwards and forwards. It is composed almost wholly of the ulnar element of the primitively double carpal pad, the radial or inner element being represented merely by a very small lobe jutting from its postero-internal end. Connecting the point of the carpal pad with the postero-external extremity of the plantar pad is a narrow strip of naked or nearly naked skin. Apart from this strip the plantar pad is everywhere surrounded by hair.

The *hind foot* (text-fig. 1, B) in its general features resembles the fore foot. There are, however, no well-defined skin-lobes protecting and forming sheaths for the claws. The hallux or 1st digit is set a little farther back, but is still close to the postero-internal angle of the plantar pad. This portion of the plantar pad terminates in a small area of naked skin, which may represent the hallucal lobe of the plantar pad. At all events it occupies the position of that lobe. There is no trace of any pad or naked area of skin on the lower side of the foot behind (above) the plantar pad.

I have not been able to examine the feet, either fresh or preserved in alcohol, of *V. civettina*, *megaspila*, and *tangalunga*. Of the first, the so-called Malabar Civet, no material of any kind is available. Of the other two, there are several dried skins in the British Museum. So far as it is possible to judge from these, the feet of *V. tangalunga* resemble those of *V. zibetha*, at all events in the matter of hair-growth ; but those of *V. megaspila* have the area between the plantar and digital pads much less thickly hairy. It is not indeed possible to affirm the presence of hairs on this area in all specimens ; but in some examples short hairs are visible between the pads. Perhaps this species differs from *V. zibetha* and *V. tangalunga*, so far as this character is concerned, in the same way as the specimens of *Viverricula malaccensis* and *V. rasse*, described below, differ from each other.

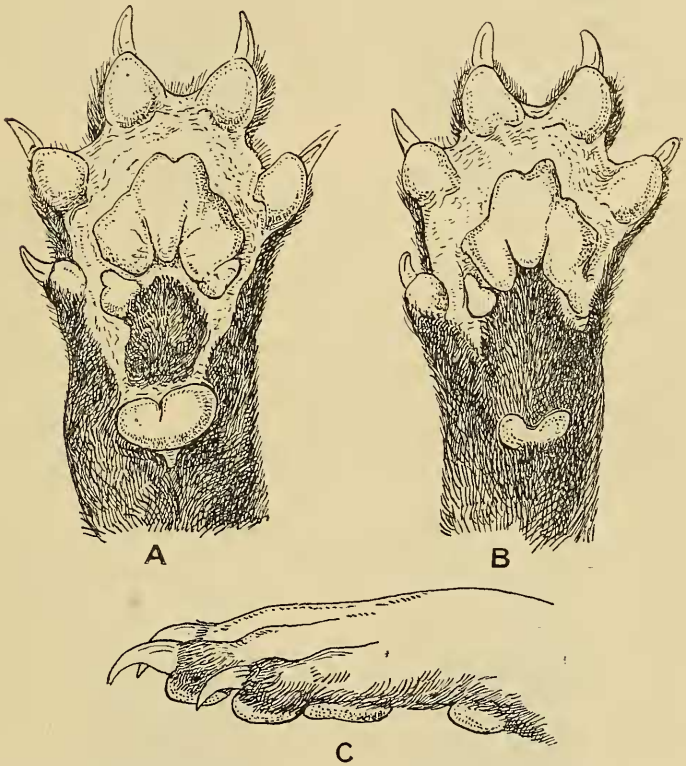
The Feet of Civettictis (*gen. nov.*) civetta *Schreb.*

The *fore foot* (text-fig. 2, A, C) differs markedly from that of *V. zibetha* in the following particulars. The whole of the underside round the plantar pad up to the margin of the webs and the digital pads is quite naked. The pollical lobe of the plantar pad, though small, forms a quite distinct excrescence set just behind the postero-internal angle of the plantar pad and on a level with the digital lobe of the pollex, from which it is separated by a narrow area of naked skin. From the pollical lobe and from the corresponding external angle of the plantar pad, there usually

* It does not appear to be generally realized that the extent to which the claws are "sheathed" varies considerably in different species of Felidæ.

runs backwards on each side a narrow strip of naked or nearly naked skin, the two uniting posteriorly just in front of the carpal pad and anteriorly just behind the plantar pad. They circumscribe a large, subovate area thickly covered with hair, and corresponding to the hairy area behind the plantar pad in *V. zibetha*.

Text-figure 2.



A. Inferior view of left fore foot of *Civettictis civetta*. [Sometimes the carpal pad is more distinctly cleft and the strips of naked skin running forwards from it may be overgrown with hair proximally.]

B. Inferior view of left hind foot of the same. [Sometimes the metatarsal pad is cleft by a line of hair.]

C. External view of left fore foot of the same.

The *carpal pad* is large, transverse, and markedly bilobed. The two lobes, both rounded or subovate, are separated by a depression, the outer or ulnar lobe being about twice as large as the inner or radial lobe. Behind them there is a small pointed area of naked skin.

The *claws* are long, projecting, not, or scarcely at all, retractile, and quite unprotected by sheaths of hairy skin.

The *hind foot* (text-fig. 2, B) differs correspondingly from that of *V. zibetha*, the area at the sides and in front of the plantar pad being naked and the pollical lobe of the plantar pad forming a distinct excrescence. Behind it there is a small backwardly directed area of naked skin. The hallux is situated a little more forward, and its digital pad is larger. In addition, however, there is a distinct flat, bilobed, sometimes divided, naked pad situated some little distance behind (above) the plantar pad, and representing the two streaks of naked skin traversing the underside of the metatarsus in *Genetta* and *Poiana* and the single small spot on that of *Fossa* *.

The Feet of Viverricula malaccensis *and* V. rasse.

I have seen no fresh specimens of *V. malaccensis*, but judging from dried skins the feet resemble those of *Viverra zibetha* in most respects. The pollex and hallux nevertheless, as noticed by previous writers, are considerably higher up; and I can find no trace of lobes of skin on the fore paw similar to those protecting the claws in *V. zibetha*. Hodgson (Calcutta Journ. Sci. ii. 1842, pl. i.) gave a sketch of the underside of the hind foot and drew attention to the presence of a small naked spot on the side of the plantar pad. This is the hallucal lobe of that pad. Its development seems to be variable, but in no case is it distinctive of this Civet, as the manner of its citation by Hodgson, Gray, and Mivart suggests.

In the specimen figured by Hodgson, and in the skins above mentioned, the area between the plantar and digital pads was thickly hairy; but in a spirit-preserved example in the British Museum, ticketed S.E. Java (*H. O. Forbes*), and therefore belonging to the species, or race, identified as *V. rasse* Horsf. by Bonhote †, the greater part of this area is naked, the hair being restricted to a triangular patch on the web between the 3rd and 4th digits and to somewhat similar patches extending backwards from the edge of the webs joining the 2nd and 5th digits to the 3rd and 4th respectively. The skin at the sides of the plantar pads and back to the digital pad of the pollex and hallux is also naked, and a narrow strip of naked skin runs from the carpal pad to the digital pad of the pollex (text-fig. 3, A, B).

The Feet of Genetta.

These have been often described but not quite so fully as might be. Mivart's figure and description of the feet of the species he identified as *G. tigrina* (P. Z. S. 1882, p. 152, fig. 3)

* A peculiarity in the hind foot of *Fossa* is the upward migration of the hallucal element of the plantar pad in company with the hallux. This and the little metatarsal pad constitute "the two bald places" mentioned by Mivart.

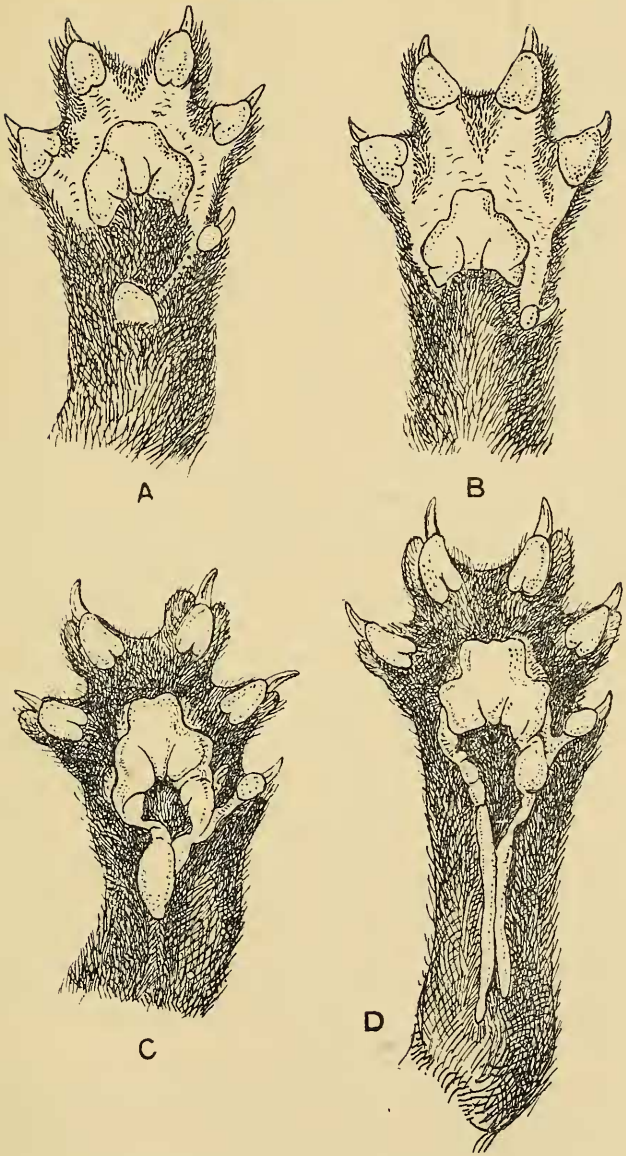
† Ann. Mag. Nat. Hist. 1898, i. p. 121.

P. Z. S. 1915. Part 1.

Owing to a mishap during printing, text-fig. 3, D, p. 137, was badly broken; this was unfortunately not discovered until after many copies had been distributed. The attached pages are to replace those previously issued.

June, 1915.

Text-figure 3.



A. Inferior view of right fore foot of *Viverricula rasse*.
B. Ditto of right hind foot of the same.
C. Ditto of right fore foot of *Genetta rubiginosa*.
D. Ditto of right hind foot of the same.

suggest, for example, that in the fore paw the carpal pads are separated from the plantar pad by a continuous tract of hair, and that in the hind paw the plantar pad is similarly cut off from the two juxtaposed narrow ridges of naked skin that traverse the underside of the metatarsus. I have not examined the feet of *G. tigrina* and can say nothing of that species; but in *G. rubiginosa* and *G. pardina* that condition does not obtain, at all events in the specimens I have seen. The pads are smooth, the area between the digital and plantar pads is thickly covered with hair, and the toes are webbed up to the proximal ends of the digital pads. The plantar pads are normally trilobed, but there are a large pollical and a hallucal lobe in contact posteriorly with the internal lateral lobe of the plantar pad of the fore and hind feet respectively. A naked strip of skin passes from the digital pad of the pollex and hallux to the corresponding lobe of the plantar pad. The carpal pad is antero-posteriorly elongate and manifestly bilobed, the external or ulnar element is much larger than the internal, the latter is connected with the pollical lobe by a naked strip of skin and a corresponding strip extends forwards from the large lobe of the carpal pad to the posterior external angle of the plantar pad. Hence the hairy patch immediately behind the plantar pad is completely cut off by naked skin from the hairs clothing the rest of the underside of the paw. Similarly in the hind feet, the two contiguous ridges of naked skin, the outer of which extends farther up the metatarsus than the inner, diverge inferiorly and are continued as narrow strips of naked skin to the postero-external and internal angles of the plantar pad, circumscribing a long triangular hairy area.

The *claws* are retractile and, except those of the hallux and pollex, are protected externally by a lobe of hairy skin. Those of the fore foot, excluding the pollex, are protected on the outer side by a small lobe of skin, the lobes of the 2nd and 5th being smaller than of the 3rd and 4th, while the 3rd has, in addition, a larger internal lobe, similar to but relatively smaller than that of *Viverra zibetha*. In the hind foot, the claws of the 3rd and 4th digits are protected externally by small lobes. That is the condition observed in a male specimen of *G. rubiginosa* (text-fig. 3, C, D); but probably the size of these lobes will be found to vary considerably in different species, for in the fore foot of an example of *G. dongolana* the lobes are all smaller than in that of *G. rubiginosa*, the lobes on the 2nd and 5th digits and the internal lobe on the 4th being scarcely perceptible.

The feet of a specimen of *G. dongolana*, from Berbera, resemble those described above, except that the underside of the pollex and hallux is hairy, there being no strip of naked skin joining their digital pads with the corresponding lobes of the plantar pad, and that in the hind foot the lower divergent ends of the two ridge-like pads are not connected by means of naked strips of integument with the posterior angles of the plantar pad, the area below

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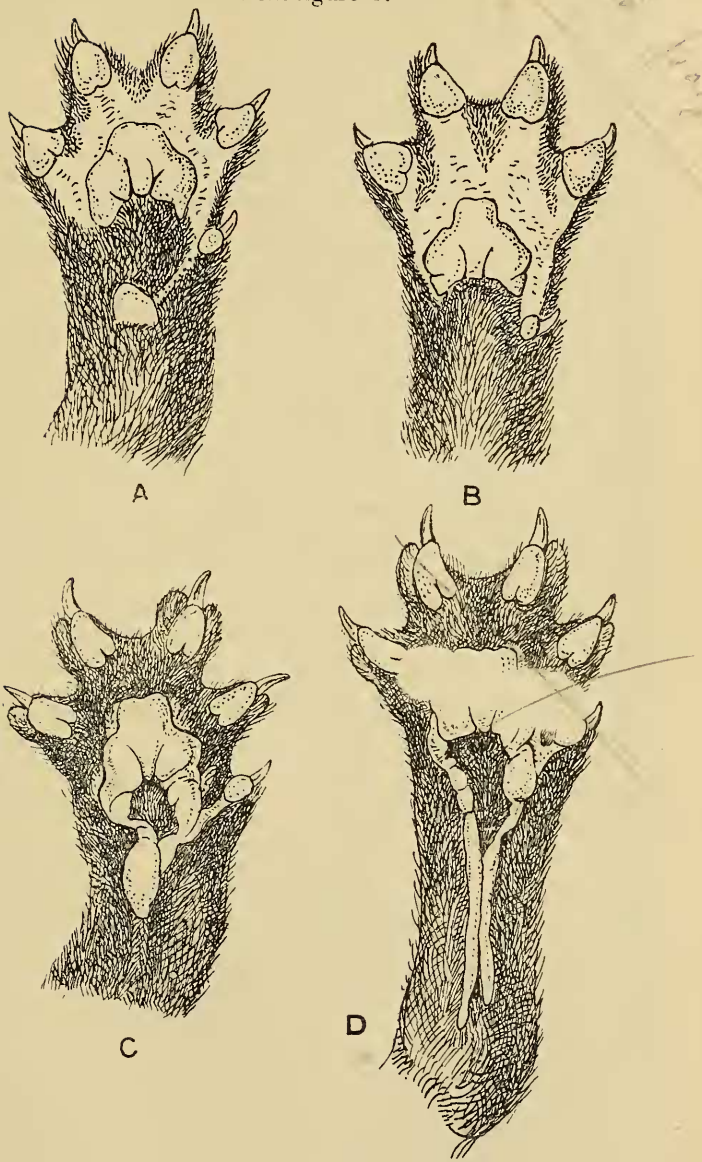

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these ridges being continuously hairy from side to side across the metatarsus.

The Feet as a Test of Specialisation.

In attempting to estimate by the structure of the feet the degree of specialisation of the four genera of Viverrine Carnivores, it may be assumed that this group is a specialised offshoot of a group of which the Paradoxures and their allies are existing representatives; and that this Paradoxurine group had feet not only with the area between the plantar and digital pads naked, but also the area behind the plantar pad. This latter area extended on the hind foot up to or almost up to the heel (tarsus) and covered nearly the whole width of the underside of the metatarsus. On the fore foot it included two large carpal pads, together approximately equalling or surpassing in size the plantar pad. The inner or radial carpal pad was in contact with the well developed pollical lobe of the plantar pad, and the outer or ulnar carpal pad similarly reached the external lateral lobe of the plantar pad. The central space between the median portion of the plantar pad and the carpal pads was depressed and covered with thinner naked skin. The pollex and hallux were low down, only a little distance behind the second digits of the paws, and abutted against the pollical and hallucal lobes of the plantar pad respectively.

The Viverrine genera above enumerated show to a varying extent departure from the type of foot just described in the following particulars:—(1) Growth of hair over the naked integument; (2) reduction in the size of the carpal pads and of the pollical and hallucal elements of the plantar pads; (3) separation of the pollex and hallux and of the carpal pad from the plantar pad.

Those genera which exhibit these modifications in the most marked degree are the most specialised, and those in which they are least marked are the most primitive of the group, so far at all events as the feet are concerned.

Judged by this standard the genera may be arranged from highest to lowest in the following order:—(1) *Viverricula*, (2) *Viverra*, (3) *Civettictis*, (4) *Genetta*. Or perhaps they should rather be placed in pairs, the Asiatic genera *Viverricula* and *Viverra* standing together at a considerably higher level than the two African genera *Civettictis* and *Genetta*.

In the high position of the pollex and hallux, the feet of *Viverricula* are the most specialised and the most feline of the section. On the other hand, the skin-lobes sheathing the claws in *Viverra* are also a specialised and feline feature.

Civettictis is certainly more primitive than *Viverra*. Not only is the area between the plantar and digital pads naked, but in the fore foot this naked area is extended backwards on each side to the carpal pad. The carpal pad also is much larger and has its

ulnar or inner moiety well developed and the pollical and hallucal elements of the plantar pad form tolerably large excrescences*. Finally, in the hind feet remains of the naked metatarsal area persist as the small bilobed pad.

Between *Civettictis* and *Genetta* it is not easy to make a choice as regards degree of specialisation of the feet. The feet of *Genetta* are thickly hairy between the plantar and digital pads, the claws are short, partially retractile, and protected by small lobes of hairy skin, thus approaching those of *Viverra*. On the other hand, the pollical and hallucal lobes of the plantar pad are considerably larger than in *Civettictis*, and the carpal pads are not only larger, especially antero-posteriorly, but are situated nearer the plantar pad, both primitive features. Finally, in the hind limb the primitive naked area beneath the metatarsus is represented by the pair of median juxtaposed ridges above described. This is a much more primitive condition than that seen in any of the so-called Civets, two of which, *Viverra* and *Viverricula*, have lost all trace of this naked metatarsal area, while in *Civettictis* it is merely represented by the small bilobed metatarsal pad.

Vibrissæ and Rhinarium of Viverrinæ.

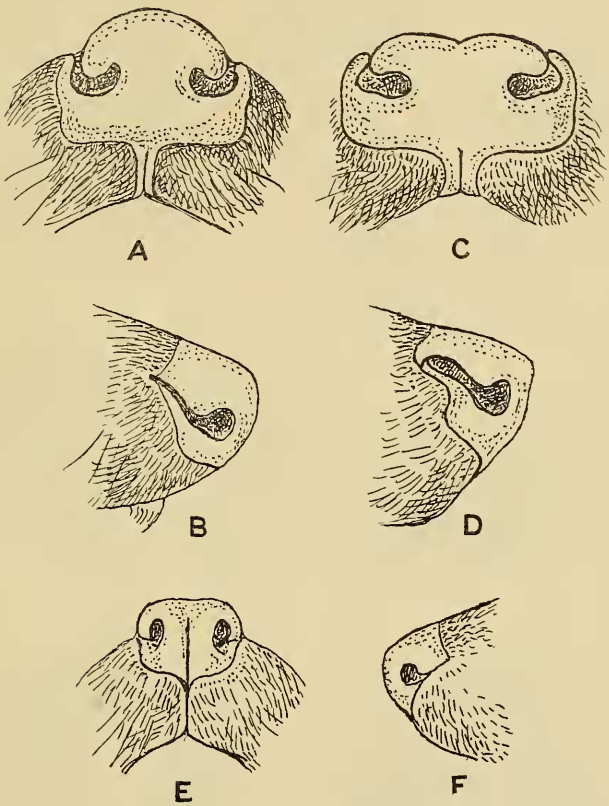
In the four genera here recognised as composing this subfamily, the vibrissæ are well developed and quite normal for the Carnivora—that is to say, there are an interramal tuft and two genal tufts in addition to the superciliary and mystacial tufts.

The rhinarium shows some interesting differences in the types examined. Daubenton long ago pointed out that the rhinarium of *Viverra zibetha* differs from that of *Civettictis civetta*. In the former (text-fig. 4, C, D) it is slightly convex antero-posteriorly above owing to the elevation of its lateral portion, but from the anterior view it is lightly bi-convex owing to a longitudinal depression along the middle line. The anterior median sulcus dividing its narrow labial portion scarcely extends above that portion, being obsolete, or nearly so, on the internarial area. In *C. civetta* (text-fig. 4, A, B) this groove is similarly shallow or indistinct above, but the upper margin of the rhinarium is more evenly convex from side to side, without trace of median depression, and in profile view it is straight, the lateral portion of the upper surface not being elevated. In *Viverricula* the rhinarium is like that of *Civettictis* in shape, but the infra-narial portion is narrower and the median sulcus extending from the labial portion is stronger and reaches up to the internarial area. In *Genetta rubiginosa* (text-fig. 4, E, F) the upper surface is flat in profile; while from the anterior aspect it is also flat with strongly rounded angles, but not biconvex as in *V. zibetha*, nor uniformly convex from side to side as in *Civettictis civetta*; and

* Provisionally, at all events, I do not attach much weight to this difference because, since Hodgson figured a small hallucal element in *Viverra zibetha*, the character must be variable and we do not know the extent of the variation.

the anterior median sulcus is more pronounced than in *Viverricula* and a little longer.

Text-figure 4.



A. Anterior view of rhinarium of *Civettictis civetta*. [The upper surface is too convex and too narrow.]

B. Side view of the same.

C. Anterior view of rhinarium of *Viverra zibetha*.

D. Side view of the same.

E. Anterior view of rhinarium of *Genetta rubiginosa*.

F. Side view of the same.

NOTE.—The width of the naked area dividing the lip below the rhinarium varies according to the degree of separation of the two portions of the lip.

It may be noted that in the biconvexity of its upper surface the rhinarium of *Viverra zibetha* approaches that of *Paradoxurus*, though it differs therefrom in the obsolescence of the anterior

internarial sulcus. Since this, however, is retained in *Genetta*, it is impossible to affirm the existence of any absolute difference between the rhinaria of the Viverrinæ collectively and of the Paradoxurinæ.

Perfume-glands of the Viverrinæ.

The Glands of Genetta.

I do not find the description of the glands of *Viverra* (including *Civettictis*) and *Genetta*, published by Chatin (Ann. Sci. Nat. (5) xix. 1874), very intelligible. In the little summary given of their distinctive features, however, he states that the glands of *Genetta* differ from those of *Viverra* in having no special pouch for the storage of the secretion. This is quoted in many text-books and is referred to by Mivart (P. Z. S. 1882, p. 156) as "a most important difference." Mivart also gives a figure of the gland of a female specimen referred to *G. tigrina*, but the accompanying letterpress does not agree with the figure, nor does it convey an accurate idea of the glands of the Genets that I have examined. The following account, therefore, may help to an understanding of this gland in the Genets and of the more elaborate gland found in the Civets.

The glands consist of two elongated eminences covered with hair both externally and internally. When undisturbed the two lobes are closely apposed, their line of contact being marked by a longitudinal sulcus which is Y-shaped anteriorly, that is to say, just behind the vulva or prepuce. In no case does the median sulcus extend forwards to the vulva as figured by Mivart for *G. tigrina*.

In males of the three species examined by me, namely, *G. pardina*, *G. rubiginosa*, and *G. dongolana* *, the space between the glandular lobes, when these are pulled apart, may be seen to be imperfectly divided into three compartments—marked in Mivart's figure by the laterally extending grooves—one in front, one

* *G. dongolana* is probably nothing but a subspecies of *G. senegalensis*, the gland of which was described by Chatin.

Description of text-figure 5, *continued*.

D. Anal and glandular area of newly born young of *Genetta pardina* ♀, the labia of the gland separated, showing two pairs of depressions.

E. The same of ♂.

F. Inferior view of anal and glandular area of *Genetta felina* ♀.

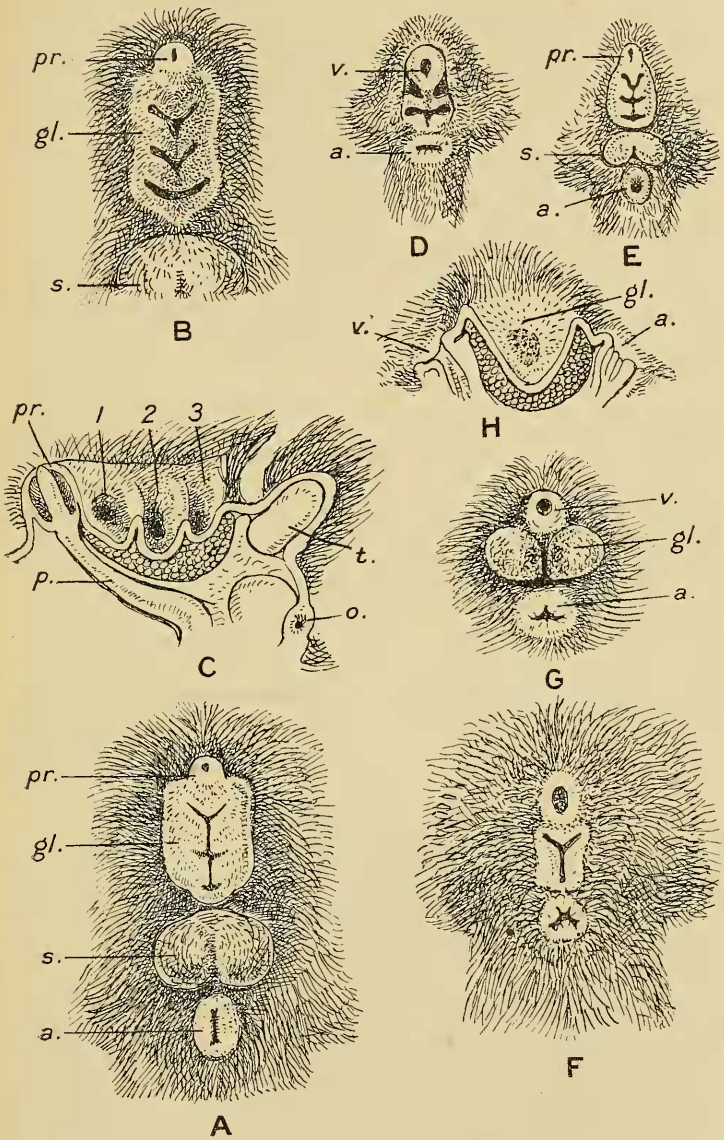
G. The same, with the labia of the glandular space separated.

H. Longitudinal and vertical section of the same.

a., anus; *gl.*, gland; *pr.*, prepuce; *s.*, scrotum; *v.*, vulva.

In fig. C; *p.*, penis; 1, 2, 3, the three glandular pouches; *t.*, testis; *o.*, orifice of anal gland within anus.

Text-figure 5.



A. Inferior view of anal and glandular area of *Genetta pardina* ♂.
B. The same, with the three glandular pouches partially distended.
C. Longitudinal and vertical section of the same.

behind, and one between the two. The compartments are separated by two transverse ridges of integument, extending across the space between the lobes but with their summits below the level of the anterior, posterior, and lateral walls of the space. Into the bottom of each of these compartments the secretion of the glands can be squeezed from a pair of laterally placed clusters of minute orifices. Thus there are six centres from which the liquid secretion exudes, three leading from the right and three from the left gland. Longitudinal and vertical section of the glandular area shows that the low partitions between the compartments of the glandular space are formed by simple uprising folds of the integument of its floor. Beneath the integument a narrow strip of the gland stretches the whole length of the glandular area; beneath and in front of the gland is the penis; behind it the testis, and below the testis the anal gland with its orifice just within the anus (text-fig. 5, A, B, C)*.

This is the condition of things in the males of the three species mentioned above; and the gland of a female Genet from Nairobi, similar in colour and markings to the S. African *G. rubiginosa*, resembled those of the males in being divided into three compartments and provided with three pairs of secreting areas, one pair for each compartment; and I do not doubt that the female Mivart identified as *G. tigrina* was similarly provided. But in a half-grown female of *G. dongolana* the gland is of a different and simpler type. The median sulcus is Y-shaped as in the male, but when the lobes are pulled apart, the space between them is seen to be undivided, with a naked floor continuous in front with the naked skin surrounding the vulva and limited posteriorly by the preanal area of integument, which is covered with short hair. Secretion under pressure can be squeezed from the inner face of the glandular lobes, but there are no definite and isolated paired secreting centres as in the male of this species and of the others described. That the characters in which the gland of this young female differ from those of the adult male are not attributable to its immaturity, is shown by the occurrence of a gland, similar to that of the adult male, in a young male that came at the same time and from the same place as the young female, but died two months before she did. The sexual differences between these two in the structure of the glands was very striking.

Again, I have drawings and notes of the gland of an adult female S. African Feline Genet (*G. felina*) that died as long ago as June 1910. In all essential respects this gland appears to have resembled that of the young female *G. dongolana*, but the glandular lobes were larger and the space between them deeper, especially posteriorly. The hair lining the inner faces of the lobes was stained with yellow secretion, which could be squeezed

* The glands are well developed in the newly born young of Genets. In the male *G. pardina* the gland resembles that of the adult; in the female it is provided with two pairs of secreting pouches (text-fig. 5, D, E).

from a definite area, pitted with numerous pores, upon each lobe (text-fig. 5, F, G, H).

The structure of the gland in the females of *G. dongolana* and *G. felina* throws light, I think, upon a difficulty that puzzled Mivart, who could not reconcile his observations upon the gland in the female of *G. tigrina* with those of Daubenton (Buffon's Hist. Nat. ix. 1761, p. 343, pls. 36–40) on the gland of what appears to have been a European Genet (*G. genetta*). Daubenton figured a simple, small glandular space lying between two lappets and furnished with a pair of secreting pores. Except that the pores were described as single orifices, this gland agrees tolerably closely with that of *G. felina*, described above. It is not surprising that these two species, which resemble each other closely in many respects, should have similar glands in the female. *G. tigrina*, on the contrary, belongs to a distinct group of the genus, which includes *G. pardina* and *G. rubiginosa* amongst other species.

So far as specific and sexual differences in the glands of Genets are concerned, my observations point to the possible division of the genus into two categories, as follows:—

1. Interglandular space tripartite and chambered, structurally alike in the two sexes (*G. tigrina*, *pardina*, *rubiginosa*);
2. Interglandular space of male as in section 1, that of female of a different and simpler type (*G. genetta*, *dongolana*, *felina*).

But until these organs have been studied in other species and in the males of *tigrina*, *felina*, and *genetta*, and the female of *pardina*, the value of this opinion consists merely in its suggesting a useful line of research.

The Glands of Viverra zibetha.

In the male of this species the gland differs in two or three points from that of *Genetta*. The glandular space between the lobes is not subdivided by transverse partitions, but is much wider in its deeper parts than at the orifice, the margins of which overlap the space towards the middle line. Nevertheless, in the specimen examined the margins or "labia" were not mesially in contact in the posterior half of the gland, being somewhat widely separated towards the scrotum and rather abruptly convergent towards the prepuce. Furthermore, the anterior part of the glandular space is roofed * over by the fusion of the integument forming the inner margins of the labia, so that the two lobes cannot be divaricated throughout their length up to the prepuce, as in *Genetta*. This overlapped area

* The gland is here described as seen from the ventral side, with the orifice looking upwards, as when the animal is lying on its back.